

WHAT IS CLAIMED IS:

1. A finished detector module assembly suitable for use in a computed tomography (CT) imaging system, said detector module comprising:

a substrate;

a photosensor array mounted on the substrate;

5 an array of scintillators optically coupled to said photosensor array and separated therefrom by a gap, said gap filled with a member of the group consisting of air and a compliant clear film; and

a flexible electrical cable electrically coupled to the photosensor array.

10 2. A finished detector module in accordance with Claim 1 further comprising a clamping mechanism clamping said array of scintillators in place above and aligned with said photosensor array.

3. A finished detector module in accordance with Claim 2 wherein said clamping mechanism is adhesively affixed to said substrate.

15 4. A finished detector module in accordance with Claim 3 wherein said clamping mechanism has a thermal coefficient of expansion less than that of said substrate.

20 5. A finished detector module in accordance with Claim 3 wherein said clamping mechanism comprises a silica glass containing titanium oxide, said array of scintillators comprises yttrium gadolinium oxide and an epoxy reflector material, and said substrate comprises a ceramic.

6. A finished detector module in accordance with Claim 2 wherein said gap is filled with air.

7. A finished detector module in accordance with Claim 6 wherein said photosensor array and said array of scintillators have facing surfaces, and wherein at least one of said facing surfaces is coated with an antireflection film.

5 8. A finished detector module in accordance with Claim 7 wherein said surface of said photosensor array is coated with said antireflection film.

9. A finished detector module in accordance with Claim 7 wherein said surface of said array of scintillators is coated with said antireflection film.

10. A finished detector module in accordance with Claim 7 wherein both said facing surfaces are coated with said antireflection film.

10 11. A finished detector module in accordance with Claim 7 wherein at least one of said surfaces is polished.

12. A finished detector module in accordance with Claim 7 wherein said surface of said photosensor array is polished.

15 13. A finished detector module in accordance with Claim 7 wherein said surface of said array of scintillators is polished.

14. A finished detector module in accordance with Claim 7 wherein both said facing surfaces are polished.

15. A finished detector module in accordance with Claim 2 wherein said gap is filled with a compliant, clear film.

20 16. A finished detector module in accordance with Claim 2 wherein said compliant, clear film is an adhesive film.

17. A finished detector module in accordance with Claim 1 wherein said gap is filled with a compliant, clear film.

18. A finished detector module in accordance with Claim 17 wherein said compliant, clear film is a material selected from the group consisting of silicone, polyester, and acrylic materials.

19. A finished detector module in accordance with Claim 17 wherein said compliant, clear film is selected from the group consisting of silicate and organic gels.

20. A finished detector module in accordance with Claim 17 and further comprising a flexible electrical cable electrically coupled to the photosensor array; and

a clamping mechanism clamping said array of scintillators in place above and aligned with said photosensor array.

21. A method for making a finished detector module suitable for use in computed tomography (CT) imaging systems, the finished detector module including a photosensor array optically coupled to an array of scintillators, said method comprising the steps of:

adhesively bonding a photosensor array to a substrate;

electrically bonding a flexible cable to the photosensor array;

preforming a compliant, clear film into a size and shape configured for placement between and optical coupling of the photosensor array to an array of scintillators;

placing the preformed film on top of the photosensor array; and

placing a scintillator array on top of the preformed film.

22. A method in accordance with Claim 21 wherein the preformed, compliant, clear film is an epoxy-based adhesive film.

23. A method in accordance with Claim 21 further comprising the step of adhesively bonding a clamping mechanism to the scintillator array to form a scintillator/clamping mechanism assembly, and said step of placing the scintillator array on top of the preformed film comprises the step of adhesively bonding the clamping mechanism of the scintillator/clamping mechanism assembly to the substrate.

24. A method in accordance with Claim 23 wherein the clamping mechanism has a thermal coefficient of expansion less than the substrate.

25. A method in accordance with Claim 24 wherein the clamping mechanism comprises a silica glass containing titanium oxide, the array of scintillators comprises yttrium gadolinium oxide and an epoxy reflector material, and the substrate comprises a ceramic.

26. A method for making a finished detector module suitable for use in computed tomography (CT) imaging systems, the finished detector module including a photosensor array optically coupled to an array of scintillators, said method comprising the steps of:

adhesively bonding a photosensor array to a substrate;

electrically bonding a flexible cable to the photosensor array;

adhesively bonding a clamping mechanism to a scintillator array to form a scintillator/clamping mechanism assembly, and

adhesively bonding the clamping mechanism of the scintillator/clamping mechanism assembly to the substrate so that a surface of the scintillator opposes a surface of the photosensor array across an air gap.

27. A method in accordance with Claim 26 wherein the clamping mechanism has a thermal coefficient of expansion less than the substrate.

28. A method in accordance with Claim 26 wherein the clamping mechanism comprises a silica glass containing titanium oxide, the array of scintillators comprises yttrium gadolinium oxide and an epoxy reflector material, and the substrate comprises a ceramic.

5 29. A method in accordance with Claim 26 further comprising the step of coating at least one of the opposing faces of the array of scintillators and the photosensor array with an antireflection coating.

10 30. A method in accordance with Claim 29 further comprising the step of polishing at least one of the opposing faces of the array of scintillators and the photosensor array.